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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/500,280
Filing Date: June 28, 2004
Appellant(s): BAKKER ET AL.

____
Del Christensen
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 06/11/2009 appealing from the Office action mailed 10/29/2008.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

No amendment after final has been filed.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is substantially correct. The changes are as follows:

Claims 9 and 11 are obvious over Atkinson in view of Engle and Skrebowski

(not Atkinson in view of Engle and Alferov)

Claims 13, 14, and 15 is obvious of Atkinson in view of Engle, and Alferov

(not Atkinson in view of Engle and Coggins)

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

2,683,972	ATKINSON	10-1951
3,259,145	ENGLE	3-1963
6,372,019	ALFEROV	4-2002
3,411,309	SKREBOWSKI	11-1967
4,208,196	COGGINS	6-1980

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-7, 12, and 16-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Atkinson (US 2,683,972) hereafter Atkinson in view of Engle (US 3,259,145) hereafter Engle.

In regard to claim 1, Atkinson teaches an apparatus comprising a primary gas cooling device (13-vortex tube) which has a liquefied and/or solidified condensables enriched fluid outlet (14 or inlet for 14 in wall of 11) and a primary condensables depleted fluid outlet (17); a secondary fluid separation vessel (11) having a tubular section of which a central axis has a substantially vertical orientation, which vessel is connected to said condensables enriched fluid outlet (14 or inlet for 14 in wall of 11) of

said primary gas cooling device (13), wherein during normal operation of the vessel the condensables enriched fluid is induced to swirl around the central axis of the tubular section of the vessel (as with the high speed at which the fluid will enter the vessel (11) there will be swirling fluid which will be forced to swirl around the central axis of the tubular section by the walls of the vessel (11)) such that a tertiary stream (interpreted as a third stream) of liquefied and/or solidified condensables is induced by gravity and centrifugal forces to swirl in a downward direction alongside an inner surface of the tubular section of the vessel (11) into a liquid collecting tank (either 12, 29, or both) at or near a bottom of the vessel (11), which tank (either 12, 29, or both) is provided with a heater (18) for heating the tertiary mixture to reduce the amount of solidified condensables and is provided with one or more outlets (33, 32) for discharging the tertiary mixture from the tank (either 12, 29, or both); the enriched fluid outlet (14 or inlet for 14 in wall of 11) also injects in use condensables enriched fluid in an at least partially tangential direction (partially tangential being interpreted to mean in any direction not parallel to the radius of the tubular section) into an interior of the secondary separation vessel (11).

Atkinson does not teach a plurality of primary gas cooling devices nor that the outlets of such are connected at regular circumferential intervals to the tubular section of the secondary separation vessel. However, as is commonly known in the art and taught by Engle (column 1, lines 47-60) a vortex tube provides colder temperatures as the flow rate through the cold outlet is *decreased*, therefore, by adding additional vortex tubes in parallel to the secondary separation vessel of Atkinson (11; in the same

manner as the one vortex tube is provided), the flow rate through each of the individual vortex tubes would be decreased and the condensation temperature would be lowered or alternatively for a set condensation temperature a greater volume of condensables would be liquefied increasing the productivity of the system. Therefore, it would have been obvious to one of ordinary skill in the art, at the time the invention was made, to modify separation system of Atkinson with a plurality of vortex tubes as taught by Engle to increase the capacity of the system to improve the processing capacity of the system.

In regard to claim 2, Atkinson teaches that the liquid collecting tank (12, 29) comprises an upper liquid outlet (33) and a lower liquid outlet (32).

In regard to claim 3, Atkinson teaches that the separation vessel (11) is equipped with a tertiary gas outlet conduit (containing stream 21) having an inlet (see Fig. 1) which is located at or near the central axis of the tubular section.

In regard to claim 4, Atkinson teaches that the separation vessel (11) has a dome shape which is mounted on top of the tubular section (see Fig. 1) and the tertiary gas outlet conduit is arranged substantially co-axial to the central axis of the tubular section and passes through said top.

In regard to claim 5, see claim 1.

In regard to claim 6, the combination discussed above for claim 1 results in the plurality of primary cooling device outlets to inject in use condensables enriched fluid in an at least partially tangential and partially downward direction into the interior of the secondary separation vessel (11).

In regard to claim 7, Atkinson teaches that the collecting tank (12) is formed by a cup-shaped tubular lower portion of the secondary separation vessel (11) which is substantially co-axial to the central axis and has a larger internal width than the upper portion of the vessel (11).

In regard to claim 12, Atkinson teaches that the liquid collecting tank (12) is provided with a grid of heating tubes that are designed to heat the liquid and solid fluid mixture in the tank to a temperature of at least 15 degrees Celsius (column 4, lines 1-12).

In regard to claim 16, the combination discussed for claim 1 would result in each of the gas cooling devices having a choke (15; choke is interpreted as orifice or restriction).

In regard to claim 17, see remarks for claim 1.

In regard to claim 18, see the combination discussed for claim 1; further, Atkinson teaches that the fluid mixture is a natural gas stream which is cooled in the gas cooling devices comprising one or more primary cyclonic inertia separators (13) to a temperature below 0 degrees Celsius (equivalent to 32 degrees Fahrenheit; column 3, line 70) thereby condensing and/or solidifying aqueous and hydrocarbon condensates and gas hydrates and the tertiary fluid mixture comprises water, ice, hydrocarbon condensates, and gas hydrates and is heated in the tertiary collection tank to a temperature above 15 degrees Celsius (column 4, lines 1-12) and from which tank low density hydrocarbon condensates are discharged through an upper liquid outlet (33) and high density aqueous components are discharged through a lower liquid outlet (32).

In regard to claim 19, see the combination discussed for claim 17; further, Atkinson teaches that liquefied and/or solidified components are separated from the gaseous components by centrifugal force in the primary gas cooling devices (column 2, lines 45-50).

Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Atkinson in view of Engle and further in view of Coggins et al. (US 4,208,196) hereafter Coggins. Atkinson and Engle teach all of the limitations of claim 1 except that a vortex breaker (interpreted as any structure which is positioned to dissipate the kinetic energy of a fluid) be arranged in the interior of the secondary separation vessel between the lower end of the tubular section and the liquid collecting tank. However, Coggins teaches that providing a slat structure between a spinner and a liquid collection tank is well known in the art for the purpose of enhancing the liquefaction efficiency of oil well separators. Therefore, it would have been obvious to one of ordinary skill in the art, at the time the invention was made, to combine the system discussed for claim 1 with a slat structure as taught by Coggins to further improve the liquefaction efficiency (so that more of the desired hydrocarbon content of the fluid entering the system may be recovered).

Claim 9 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Atkinson in view of Engle and further in view of J.K. Skrebowski et al. (US 3,411,309) hereafter Skrebowski. Atkinson and Engle teach all of the limitations of claim 9 but do not explicitly teach ultrasonic vibration transducers on one or more components of the

assembly capable of vibrating in use one or more components of the assembly at a frequency between 20 and 200 kHz. However, Skrebowski teaches a vibration transducer (3) which vibrates a crystallizer at frequency of 30 kHz (column 1, line 64-65) or between 0.5 and 100 kHz (column 1, lines 60-65). Therefore, it would have been obvious to one of ordinary skill in the art, at the time the invention was made, to modify the assembly of Atkinson and Engle with the vibration means of Skrebowski in all locations where freezing is found (inevitably on the coldest locations such as outlets 14 and locations between outlets 14 and tank 12) for the purpose of ensuring that no frozen deposits retard flow through the system.

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Atkinson, Engle, Coggins and further in view of Skrebowski. Atkinson, Engle, and Coggins teach all of the limitations of claim 10, but do not explicitly teach that the plurality of primary cooling devices (13) and the vortex breaker (slat) are equipped with ultrasonic vibration transducers. Skrebowski teaches a vibration transducer (3) which vibrates a crystallizer at frequency of 30 kHz (column 1, line 64-65) or between 0.5 and 100 kHz (column 1, lines 60-65) for the purpose of removing and maintaining frozen deposits off of the coldest surfaces. Therefore, it would have been obvious to one of ordinary skill in the art, at the time the invention was made, to modify the assembly of Atkinson and Engle with the vibration means of Skrebowski in all locations where freezing is found (inevitably on the coldest locations such as outlets 14 and the vortex breaker) for the purpose of ensuring that no frozen deposits retard flow through the system and for the

further purpose of allowing such deposition to be prevented while still maintaining a high efficiency of liquefaction.

Claims 13, 14, and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Atkinson, Engle, and further in view of Alferov et al. (US 6,372,019) hereafter Alferov.

In regard to claim 13, Atkinson and Engle teach all of the limitations of claim 13 but do not explicitly teach that the vortex tube (13) of Atkinson comprises an expansion nozzle, one or more swirl imparting vanes, or a diverging outlet section equipped with a central primary condensables depleted outlet conduit and an outer secondary condensables enriched fluid outlet conduit. However, Alferov teaches a primary cyclonic inertia separator (Fig. 1) comprising an expansion nozzle (5; column 6, lines 10-15; column 4, lines 20-25, 45-50; capable of such temperature function; depends on the operating conditions and working fluids) by a substantially isnentropic expansion (interpreted to mean an expansion that has relatively low losses, column 7, lines 58-65) and one or more swirl imparting vanes (4; column 5, line 65) which can induce the fluid to swirl into a diverging outlet section (all elements to the right of 9 and including 9) equipped with a central primary condensables depleted fluid outlet conduit (13) and an outer secondary condensables enriched fluid outlet conduit (11). Alferov teaches that the separator provides increased separation efficiency (column 4, lines 25-30). Therefore, it would have been obvious to one of ordinary skill in the art, at the time the invention was made, to replace the plurality of vortex tubes of Atkinson and Engle with

the more efficient separators Alferov for the purpose of increasing the separation efficiency of the process.

In regard to claim 14, Alferov teaches that each primary cyclonic inertia separator (Fig. 1) comprises an expansion nozzle (5) designed to accelerate the fluid mixture within the nozzle (5) to a supersonic speed (column 2, line 53, column 4, line 1), thereby cooling the temperature of the fluid passing through the nozzle to a temperature lower than -20 degrees Celsius (capable of such function; depends on the operating conditions and the working fluid).

In regard to claim 15, the combination of Atkinson, Engle, and Alferov as discussed relative to claim 13 teaches a plurality of primary cyclonic inertia separators (Fig. 1-Alferov) of which the expansion nozzles (Alferov-5) are substantially parallel and equidistant to the central axis of the tubular section (set by the diameter of 11 - Atkinson and Engle) of the secondary separation vessel (Atkinson and Engle - 11) and of which the secondary condensables enriched fluid outlets (Atkinson and Engle - inlet for 14 in wall of 11) are connected to the secondary fluid injection conduits (Alferov - 11) which intersect the wall of the tubular section of the secondary separation vessel (11) at regular circumferential intervals and in an at least partially tangential direction (as stated before in claim 1), and which secondary fluid injection conduits (Alferov - 11) each have a length less than 4 meters (clear by column 12, lines 20-30; at least a portion of conduits 11 ensured to have a length less than 4 meters).

(10) Response to Argument

1. Appellant's arguments (page 4, ¶ 3) are an allegation that the vortex tube of Atkinson does not have a condensables enriched fluid outlet. In response to the Appellant's arguments, the examiner fully disagrees as the outlet (14) fully meets the claimed structure. Atkinson explicitly teaches that water condenses along with condensable hydrocarbons as a result of the reduced temperature at cold end (14; column 3, lines 1-10). Therefore the allegation is unpersuasive. Further it is noted that the apparatus claim requires an outlet through which a fluid enriched in condensables may flow. Therefore, it is noted that a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. Clearly, the outlet (14) of Atkinson is capable of performing the function of allowing a fluid enriched in condensables to flow out thereof as explicitly stated by Atkinson,

"*The cold stream is passed out of the end **14** and into the chamber **11** wherein the water condenses along with condensable hydrocarbons as a result of the reduced temperature*." (column 3, lines 4-7)

Atkinson further states, that "*The condensed hydrocarbons, hydrates, and water fall by gravity into the warm zone **12**...*" (column 3, lines 9-11). It is noted that there are a number of other locations where Atkinson teaches that a fluid (liquid) enriched in condensables passes through outlet (14; column 4, line 32; column 1, lines 40-44; column 2, lines 5-12; etc...).

Therefore, there is no uncertainty that the outlet (14) is not only capable of performing the function, but also teaches the function and method as well.

2. Appellant's arguments (page 5, ¶ 2) are an allegation that the cold outlet does not contain a stream enriched in condensables. In response to the Appellant's arguments, the examiner directs attention to the stream of liquid or condensed hydrocarbons (etc) that is explicitly taught by Atkinson through the outlet (14). Therefore, clearly the allegation is unpersuasive.

3. Appellant's arguments (page 5, ¶ 2) are an allegation that a document (US 6,932,858; not of record and provided in an evidence appendix of the appeal brief, hereafter Appeal reference) suggests using a vortex tube such that the hot stream from the vortex tube may have a greater concentration of condensables than a cold stream. In response to the Appellant's arguments, the examiner disagrees that the teachings of US 6,932,858 show that Atkinson fails to teach the claimed invention. There are millions of patents that do not teach the claimed invention; however, such is not relevant to the final rejection. Atkinson teaches an apparatus having the outlet claimed and teaches a method of using the outlet as claimed and therefore, citation of a document that suggests that a vortex tube may be used in a different way does nothing to negate the explicit teachings of Atkinson. Therefore, the allegation is unpersuasive.

4. Appellant's arguments (page 5, ¶ 2) are that the inherent operation of a vortex tube results in the hot stream from a vortex tube being enriched in condensables. Appellant supports this allegation by showing a reference (Appeal reference, see 3 above) that teaches that a vortex tube may be used to provide a condensables enriched

hot stream. In response to the Appellant's arguments, the examiner disagrees that the appeal reference is sufficient evidence that a cold stream exiting outlet (14) of Atkinson is not capable of having a condensables enriched fluid **because** (1) the explicit teachings of Atkinson show that such a fluid does flow through outlet (14) and (2) evidence of another use is not evidence that the explicit use taught by prior art of record is impossible.

5. Appellant's arguments (page 5, ¶ 4) are an allegation that Atkinson teaches that condensables are separated from the cold stream by "centrifical" separation (sic…apparently intending centrifugal). In response to the Appellant's arguments, the examiner disagrees fully and notes that Atkinson explicitly teaches that condensed hydrocarbons flow through outlet (14) by the cold temperature created by the vortex tube (column 3, line 7).

(11) Related Proceeding(s) Appendix

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/John F Pettitt /

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